

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

POND (No.) CODE 378

Design Criteria for Embankment Ponds

In addition to the National Standard, the minimum hydrologic design for dams greater than 6 feet effective height with more than 50 ac-ft of storage or dams greater than 25 feet effective height and with more than 15 ac-ft of storage shall be as follows:

- A. Principal Spillway Storm* - 2.5 to 3.0 inches of rainfall per 24 hr. (See Figure 1.)
- B. Emergency Spillway Storm – 50 year 24 hour frequency (See Figure 2).
- C. Freeboard Storm – 100 year 24 hour frequency (See Figure 3).

*Principal spillway criteria does not apply to ponds whose drainage area is essentially the same as the surface area (e.g. commercial fish ponds).

A trickle tube shall be required for all ponds with a drainage area greater than 5 acres. The crest elevation of the trickle tube shall be no less than 0.5 feet below the crest of the emergency spillway for dams having a drainage area of 20 acres or less, and no less than 1 foot for those having a drainage area of more than 20 acres. The minimum trickle tube size for a pond is shown in Table 1. All trickle tubes shall have a trash guard to prevent the conduit from clogging.

Table 1 – Minimum Trickle Tube Size*

Drainage Area Acres	<u>Siphon</u> SSP & PVC Inches	<u>Drop Inlet**</u> PVC & SSP, CMP Inches	<u>Downstream</u> <u>Riser</u> Inches
5 – 10	4	8 x 6	10 x 8
11 – 20	4	8 x 6	10 x 8
21 – 50	6	8 x 6	12 x 8
51 – 100	8	10 x 8	15 x 10
101 – 175	10	15 x 10	18 x 12
176 – 300	12	18 x 12	21 x 15

*Applies to dams less than 6 feet effective height than more than 50 ac-ft of storage and dams less than 25 feet effective height with less than 50 ac-ft of storage.

**Riser diameter X barrel diameter.

***Special design required.

Freeboard – The minimum freeboard for ponds having a surface exposure (fetch) of 1000 feet or less shall be as required by the National Standard.

Additional freeboard shall be provided, to contain waves, for ponds having longer surface exposure (fetch) by addition of the following amounts to the applicable freeboard given above:

<u>Fetch</u> (feet)	<u>Freeboard</u> (feet)
1001 – 1250	0.2
1251 – 1500	0.4
1501 – 1750	0.6
1751 – 2000	0.8
over 2000	increase proportionally

Wave Erosion Protection – When the surface exposure (fetch) of the pond exceeds 1,000 feet the upstream face of the dam shall be protected from wave damage by one of the following methods:

1. At least an 8-foot wide berm located approximately 1.0 foot above the planned waterline.
2. A 4-foot bank of structural material such as precast preforated concrete block, riprap or broken concrete extending to an elevation at least 2 feet below and 2 feet above the planned waterline.
3. Increase the width through the dam at the planned waterline at least 4 feet. This increase in

width may be obtained by increasing the top width or freeboard, or by flattening the side slopes.

4. Soil cement.
5. Planting vegetation of the right character and height on properly constructed berms (Ref. TR-56).

The assistance and approval of the state office is required when use of soil cement, concrete blocks or vegetation is planned for protection of the upstream face of the dam.

Allowance For Settlement – The design height of the dam shall be increased by the amount needed to insure that the design top elevation will be maintained after all settlement has taken place. This increase shall be as follows:

<u>Dams constructed with</u>	<u>Allowance in percent</u>
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Bulldozers	10
Draglines	20*
Carryalls and scrapers	5

*Use of draglines alone is not permissible for dams with maximum fill heights exceeding 10 feet.

Actual allowance for settlement (in excess of the minimum listed) shall be determined by the technician for the individual site based on soil type, moisture conditions, contractor and experience in the area.

Downstream Riser – A downstream riser, with a maximum diameter of 12 inches, may be used where the static head does not exceed 16 feet (the difference in elevation between the riser crest and the centerline of the horizontal barrel). The downstream riser shall be braced, and its base suitably protected against splash erosion.

Ponds Constructed Primarily for Game Fish Production

Where ponds are to be constructed primarily for game fish production, they shall be located so that the drainage area will produce adequate runoff; however, peak outflow shall be small enough to limit the design spillway flow to 6 inches in depth. Design spillway flow depth may be increased when a trickle

tube is used. The trickle tube shall be set a minimum of 1 foot below the crest of the emergency spillway for dams having a drainage area of 20 acres or less and shall be set a minimum of 1.5 feet below the crest of the emergency spillway for dams having a drainage area of more than 20 acres. The trickle tubes shall be sized to decrease the use of the emergency spillway. The landowner should be informed that fish stock may be lost during storms causing high spillway flow depth. Trickle tubes should remove water from the bottom and not the surface of the pond storage area. Shallow water edges should be deepened to provide an 18 to 36 inch water depth. See Standards and Specifications – 399 (Fishpond Management), Land Management Guide, Biology Job Sheets and Technical Notes on fisheries for biological recommendations, and Landscape Architecture Note 4.

EXCAVATED PONDS

Design Criteria

Minimum Size

The minimum size excavated pond shall have 2,400 square feet of surface area, with a minimum top width of 40 feet. It is desirable that twenty percent of the surface area shall be 6 feet deep. However, a minimum of 16 percent of the surface area shall be 6 feet deep, except where the depth is limited to less than 6 feet by a permeable stratum and no other source of water is practicable. See Standard and Specifications 399 (Fishpond Management), Land Management Guide, Biology Job Sheets and Technical Notes on fisheries for biological recommendations.